#### LA-UR-23-23642

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Title: Early Days

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Intended for: Public talk hosted by the Bradbury Science Museum April 17th.

**Issued:** 2023-04-07









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#### Early Days

These slides are for a history presentation about the foundation of the Laboratory that is being hosted by the Bradbury Science Museum on April 17th, 2023. The event will be open to the public.



# Early Days

#### The Foundation of the Laboratory at Los Alamos

NATIONAL SECURITY

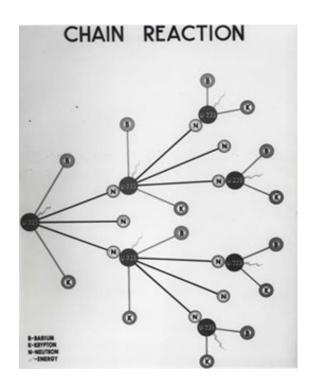


**Madeline Whitacre** 





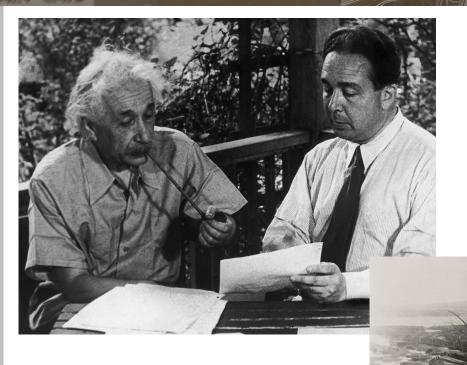




Fission is discovered in Nazi Germany in 1939

# Early US Research





- August 2<sup>nd</sup> 1939 Einstein-Szilard Letter
- Oct 21<sup>st</sup> the Advisory Committee on Uranium first meets

Halifax, December 1917

## The US Commits to Atomic Weapons Development





It has been known for the past few years that very large stores of storic energy are present in Evaluation. Besides the extremely alow release which occurs naturally and is an exemple of rediscastivity. More is cutther process which gives some hope that it may be possible to release the energy fast enough to have practical applications. The possibility of uning this energy release to make an explosive of great violence he been discussed by as in another report, and has been shown to involve the extraction of the most active constituent of the Transma celled Uggs. It however, we wish to mae the atomic energy as a prime mover, that is an another constituent of the Uranian celled Uggs. It however, we wish to mae the atomic energy as a prime mover, that is an ambetitute for coal or oil in the production of power, this excussion, and it makes it harder to release the energy. The presence of the less notive part of the Uranium, though it makes it harder to release the score; and may indeed increase, the anount evaluation of the energy and may indeed increase, the anount evaluation of the ental or preferrably in a compound, almost the attraction of the metal or preferrably in a compound, almost he attraction of the metal or preferrably in a compound, almost her countries, and court accountly by it, inclose and Dr. Kowarzia, who have proportion with a substance known as heavy rates.

Though this substance is at present only available as fairly rare obsciousl, and although quantities of the order of staveral tone would be required to make the experture work. We consider that the method has considerable possibilities. The energy that can theoretically be derived from uranium consumed in this way amounts to 12 million H.r. hours per 15. And in addition large amounts of artificial radio-active substances would be formed which might have important applicable that the production of the heavy setter there are abstances the production of the heavy setter there are fundamentally to the setter there are also account to the setter there are the setter of t

We are informed, however, that steps are being taken in U.S. to produce heavy water on a large scale, and since Dra. Halban and Kowneski have done all that they can with the supplies which they brought to this country, we think that they should be allowed to continue their work in U.S. Arrangements should be made through the existing channels to keep us informed of their results, since if, as we hope, the work on

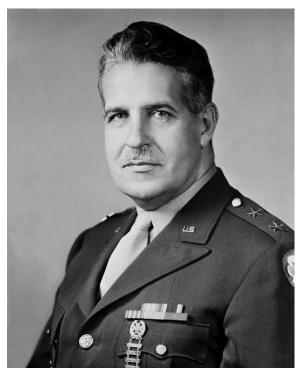


Vannevar Bush OSRD Director

- April 1940 MAUD
   Committee established
- July 1940 Final MAUD Report
- October 9<sup>th</sup> 1941 Bush presents the report to Roosevelt
- December 7<sup>th</sup> Attack on Pearl Harbor
- January 19<sup>th</sup> Roosevelt officially approves production of an Atomic Weapon







General Leslie Groves US Army Corps of Engineers Manhattan Project Director

- August 1942 Manhattan
   Engineer District created
- September 17<sup>th</sup> Groves assigned to head the project
- September 19<sup>th</sup> granted AAA priority





Los Alamos Boys Ranch School Graduation



J Robert Oppenheimer Project Y Director

#### April 1943: Primer Lectures



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The designated "UNITED Indicates a total feeling with information in the formation in the figure and the feeling with information in the figure and the feeling with information in the figure and information in the first two weeks of April 1943, as an "indoctrination course" in connection with the starting of the Los Alamos froject. The notes were written up by E. U. Condon information.

1. Object

The object of the project is to produce a pradical military weapon in the form of a bomb in which the energy is released by a fast neutron chain reaction in one or more of the materials known to show nuclear fission.

2. Energy of Fission Process

The direct energy release in the fission process is of, the order of 170 MeV per atom. This is considerably more than 10 times the heat of reaction per atom in ordinary combustion processes.

This is 170·106·4.8·10-10/300 =2.7·10-4 erg/nucleus.

Since the weight of 1 nucleus of 25 is 3.88·10-22 gram/nucleus the energy release is

#### 1 kg of 25 $\approx$ 20000 tons of TNT 3. Fast Neutron Chain Reaction

7.10<sup>17</sup> erg/gram
The energy release in TNT is 4.10<sup>10</sup> erg/gram or 3.6.10<sup>16</sup> erg/ton.

Release of this energy in a large scale way is a possibility because of the fact that in each fission process, which requires a neutron to produce it, two neutrons are released. Consider a very great mass of active material, so great that no neutrons are lost through the surface and assume the material so pure that no neutrons are lost in other ways than by fission. One neutron released in the mass would become 2 after the first fission, each of these would produce 2 after they each had produced fission so in the nth generation of neutrons there would be 2<sup>n</sup> neutrons available.

Since in 1 kg. of 25 there are  $5\cdot10^{25}$  nuclei it would require about n= 30 generations (  $2^{50}\approx5\cdot10^{25}$ ) to fish the whole kilogram.

While this is going on the energy release is making the material very hot, developing great pressure and hence tending to cause an exposion.

In an actual finite setup, some neutrons are lost by diffusion out through the surface. There vill be therefore a certain size of surface percentages of neutrons are

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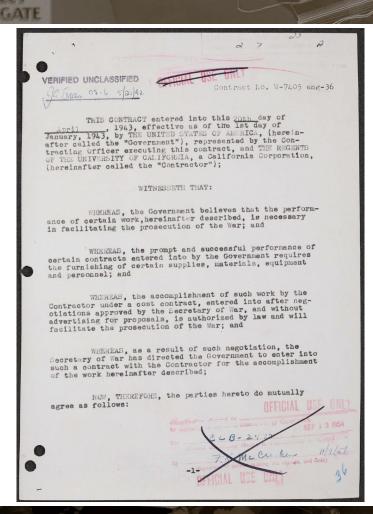
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THOUSEN EIMITE

- First two weeks of April, 1943
- Summary of the current nuclear physics knowledge base
- Practical military weapon
- Attendees included
  - Robert Oppenheimer, John Manley, Seth Neddermeyer, Edward Teller, Emilio Segre

#### April 1943: UC Contract

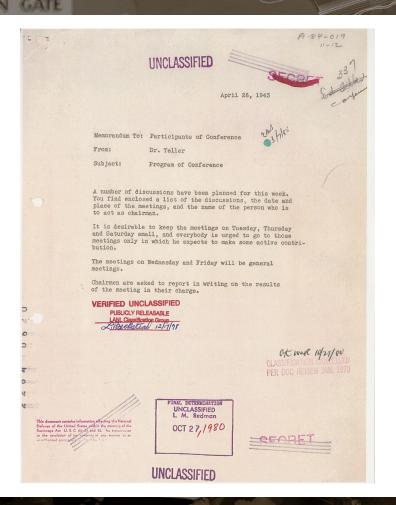




- Signed April 20, 1943
- Retroactive to January 1

## April 1943: Planning Conferences



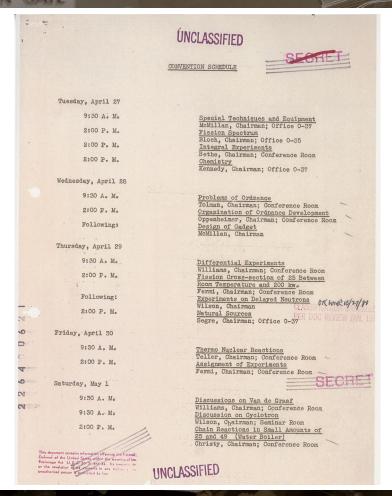


- April 15 May 6, 1945
- Held to analyze "the scientific problems of the Los Alamos Laboratory and to define its schedules and its detailed experimental program."

## April 1943: Planning Conferences







#### Attendees included

- Robert Bacher, Kenneth Bainbridge, Hans Bethe, Felix Bloch, Owen Chamberlain, Robert Christy, Edward Condon, Enrico Fermi, Richard Feynman, Stanley Frankel, Al Graves, Joseph Kennedy, John Manley, Joseph McKibben, Edwin McMillan, Seth Neddermeyer, Eldred Nelson, Robert Oppenheimer, I. I. Rabi, Emilio Segre, Robert Serber, Cyril Smith, Hans Staub, Edward Teller, Richard Tolman, Arthur Wahl, Victor Weisskopf, John Williams, and Robert Wilson.















